APPENDICES

APPENDIX A: CLINICAL DEFINITION OF ISOLATED CABG FOR DATA YEAR 1999

When any of the procedures listed in Section A were performed concurrently with coronary artery bypass surgery the case was deemed non-isolated. It is not possible to list all procedures because cases can be complex and clinical definitions are not always precise. Only cardiac procedures have been listed.

Section A

- Valve procedures
- Operations on structures adjacent to heart valves (papillary muscle, chordae tendineae, traebeculae carneae cordis, annuloplasty, infundibulectomy)
- Ventriculectomy
- Repair of atrial and ventricular septa
- Excision of aneurysm of heart
- Head and neck, intracranial endarterectomy
- Other open heart surgeries, such as aortic arch repair, pulmonary endartectomy
- Endarterectomy of aorta
- Thoracic endarterectomy (endarterectomy on an artery outside the heart)
- Heart transplantation
- Repair of certain congenital cardiac anomalies (e.g., tetralology of fallot, ASD, VSD, valvular abnormality)
- Implantation of cardiomyostimulation system (note: refers to cardiomyoplasty systems only, other heart-assist systems such as pacemakers or ICDs not excluded)
- Any aortic aneurysm repair (abdominal or thoracic)
- Aorta-subclavian-carotid bypass
- Aorta-renal bypass
- Aorta-iliac-femoral bypass
- Caval-pulmonary artery anastomosis
- Extracranial-intracranial (EC-IC) vascular bypass

If a procedure listed in Section B below was performed concurrently with coronary artery bypass surgery, the case was considered an isolated CABG, unless a procedure listed in Section A was performed during the same surgery.

Section B

- Transmyocardial laser revascularization (TMR)
- Pericardiectomy and excision of lesions of heart
- Repair/restoration of the heart or pericardium
- Coronary endarterectomy
- Pacemakers
- ICDs

APPENDIX B: VARIABLE SELECTION

In initially determining the data elements to be collected for CCMRP, staff reviewed a consensus statement prepared by a panel of researchers from the major reporting programs including the STS, the New York State Department of Health, the Northern New England Cardiovascular Consortium, the Parsonnet group, and the Veterans Affairs (Jones et al., 1996). The analysis identified seven "core" pre-operative variables that were unequivocally related to mortality, 13 "Level 1" variables that are likely to have a relationship and are suggested for inclusion, and 24 "Level 2" variables not clearly shown to relate directly to short-term CABG mortality. Staff presented this information to the Technical Advisory Panel (TAP) for its review and discussion. In 1996, the TAP recommended collection of all Core and Level 1 variables, and the majority of Level 2 variables identified by Jones et al. for CCMRP.

Table B-1: Variable Selection

Category	Core Variables	Level 1 Variables	Level 2 Variables
Demographics	Age Gender	Height Weight	Race Educational level Marital status Location of residence
Administrative			Institution where CABG performed Surgeon responsible for CABG Payment source
History	Previous heart operation	PTCA on current admission Date of most recent MI Angina history	Date of last cardiac operation Number of previous CABG surgeries Angina on admission Number of previous PTCAs Date of most recent PTCA Number of previous MIs
Left ventricular function	Left ventricular ejection fraction		Left ventricular end-diastolic pressure
Left main disease	% stenosis left main coronary artery		
Other cardiac conditions		Serious ventricular arrhythmias Congestive heart failure Mitral regurgitation	
Cardiovascular risk factors		Diabetes Cerebrovascular disease Peripheral vascular disease	Smoking Hypertension Diabetes sequelae
Co-morbid conditions		COPD Creatinine levels	Cardiac pacemaker Refusal of blood products Substance abuse Liver disease Malignancy Immunosuppressed state
Acuity	Elective Urgent Emergent/ongoing ischemia Emergent/hemodynamic instability Emergent/salvage		Hospital location before operation

APPENDIX C: DEFINITIONS AND INSTRUCTIONS FOR CCMRP DATA SUBMISSIONS

Table C-1: Definitions and Instructions for CCMRP Data Submissions

Data Elements	STS Definitions	CCMRP Comments, Modifications, and Examples
Date of Surgery	mm-dd-yy	
Gender	Male, female	
Date of Birth	mm-dd-yy	
Race/Ethnicity	Caucasian, Black, Hispanic, Asian, Native American, or other.	
Insurer	Primary payer: Medicare, Medicaid, private/corporate, CHAMPUS, or uninsured.	
Patient's Zip Code		
Height	Centimeters	
Weight	Kilograms	
Creatinine Level	mg/dl. Serum creatinine at time of surgery.	The STS *form* asks for the "highest creatinine" while the *STS Terms and Definitions* guide asks for the most recent pre-operative creatinine. Please follow the guide, i.e., code the most recent pre-operative value. Note also that beginning 1/1/99, the STS will collect this data element for all cases.
Hypertension	Blood pressure exceeding 140/90 mm Hg or a history of high blood pressure, or the need for anti-hypertensive medications.	Beginning 1/1/99, the STS proposes to change this definition to: 1. Documented history of HTN diagnosed and treated with medication, diet and/or exercise. 2. BP $\geq$140/90 on 2 occasions. 3. Normotensive but currently on anti-hypertensive medication.
Dialysis	Hemodialysis or peritoneal dialysis.	Check this box if the patient is *currently* on dialysis, not if the patient has ever been on dialysis. This is consistent with the proposed STS definition.
Diabetes	A history of diabetes, regardless of duration of disease or need for anti-diabetic agents.	Note that this is a very liberal definition of diabetes.
Peripheral Vascular Disease	A history of aneurysm and/or occlusive vascular disease with or without previous extra-cardiac vascular surgery.	As of 1/1/99, the STS proposes to change this definition to: "The patient has PVD, as indicated by any or all of: claudication either with exertion or rest; amputation for arterial insufficiency; aorto-iliac occlusive disease reconstruction; peripheral vascular bypass surgery, angioplasty, stent documented AAA, AAA repair or stent; documented positive non-invasive testing." Cerebrovascular disease is not included in peripheral vascular disease, since it has its own data element.
Cerebrovascular Disease	Any TIA, RIND, CVA, or history of cerebrovascular surgery.	As of 1/1/99, the STS proposes to change this definition to: "The patient has a documented history of: CVA (symptoms > 72 hrs after onset); RIND (recovery with 72 hrs); TIA (return within 24 hrs); unresponsive coma > 24 hrs; non-invasive carotid test with > 75% occlusion."

APPENDIX C: DEFINITIONS AND INSTRUCTIONS FOR CCMRP DATA SUBMISSIONS

Table C-1: Definitions and Instructions for CCMRP Data Submissions (cont.)

Data Elements	STS Definitions	CCMRP Comments, Modifications, and Examples
Ventricular Arrhythmia	Abnormal rapid ventricular rhythm causing hemodynamic collapse (tachycardia) or diffuse chaotic ventricular depolarization unable to produce an effective blood pressure.	Ventricular arrhythmia does NOT refer to frequent PVC's (premature ventricular beats), bigeminy, or non-sustained ventricular tachycardia. Note that as of 1/1/99, the STS proposes to change this definition to: "Within two weeks of the procedure, clinical documentation of sustained VT or VF requiring cardioversion and/or IV antiarrhythmics."
Myocardial Infarction	A patient is considered to have had a myocardial infarction if there is documented evidence of a: transmural infarction defined by the appearance of a new Q wave in two or more contiguous leads on ECG, or subendocardial infarction (non Q wave), which is considered present in a patient having clinical, angiographic, electrocardiographic, and/or laboratory isoenzyme evidence of myocardial necrosis with an ECG showing no new Q waves.	Check this box if the patient has *ever* had an MI. For STS users, we will collect the data element "MI" and not the element "MI Type." Note that as of 1/1/99, the STS proposes to change this definition to: "1. Patient hospitalized for an MI documented in the medical record. 2. Two of four criteria are necessary: prolonged (> 20 min) "typical" chest pain not relieved by rest and/or nitrates; enzyme level elevation; CK-MB > 5% or total CPK CK greater than 2x normal; LDH subtype 1 > LCH subtype 2; troponin > 0.2 µg/ml; new wall motion abnormalities; 3. Serial ECG (at least two) showing changes from baseline or serially in ST-T and/or Q waves that are 0.03 seconds in width and/or > or + one third of the total QRS complex in two or more contiguous leads."
Date/Time of Most Recent MI	STS data element "MI When: < 6 hrs., >6 but < 24 hrs., 1-7 days, 8-21 days, >21 days" refers to the last documented infarction.	For STS users, we will collect the variable "MI When." For users of CCMRP, we will collect date of MI and calculate the interval from MI to surgery.
Number of Prior Cardiac Operations Requiring Cardiopulmonary Bypass	Prior to this operation being recorded, which may be during this admission, how many cardiac surgical operations were performed on this patient utilizing cardiopulmonary bypass.	Note that we do not code re-dos on the same admission separately. In addition, we *may* update this definition later to reflect "minimally invasive" procedures done "off-pump."
Date of Most Recent Cardiac Operation	This is the definition for the STS variable "Date of most recent CV intervention": Date patient having undergone any previous cardiac procedure, which may be during current admission. For STS users, either record the date of the most recent cardiac operation in this field or, if you have added a customized field for this data element, record it there.	Enter the date of the most recent cardiac operation (CABG, valve surgery, intracardiac repair). Do *not* record the date of the prior PTCAs, non-cardiac vascular surgeries, pacemaker or defibrillator implantations, or other interventions. Note that there is some ambiguity on the STS data collection form, which asks for "Previous CV intervention: most recent" while the STS Terms and Definitions makes it clearer that cardiac procedures, and not vascular procedures, are the real target. In addition, the STS form makes it difficult to tell whether the most recent CV intervention was a bypass, a PTCA, or some other procedure since one can "check-off" more than one box, and the date of the last catheterization is captured under "Catheterization Data".
Number of Prior PTCAs	Total number of previous PTCA/Atherectomy procedures prior to the cardiac surgical procedure.	The number of PTCAs refers to the number of separate procedures (including any performed during the current hospitalization), NOT the number of vessels dilated.
PTCA/Atherectomy During Current Admission	Was the interventional cardiologic procedure performed during the same in-patient admission as the current operation? Yes/No	
PTCA to Surgery Time Interval	<6 hrs., >6 hrs.	If PTCA occurred during this admission. Note beginning 1/1/99, the STS proposes to rename this data element "Unplanned CABG" and to collect the date and time of the last intervention, and date and time of the last surgical intervention.

APPENDIX C: DEFINITIONS AND INSTRUCTIONS FOR CCMRP DATA SUBMISSIONS

Table C-1: Definitions and Instructions for CCMRP Data Submissions (cont.)

Data Elements	STS Definitions	CCMRP Comments, Modifications, and Examples
Chronic Obstructive Pulmonary Disease	A patient who requires pharmacologic therapy for the treatment of chronic pulmonary compromise, or a patient who has a FEV1 < 75% of predicted value.	After 1/1/99, the STS proposes to change the name of this data element to "Chronic Lung Disease," and to replace the existing definition with: "Patient with clinical documentation of any of the following: pharmacologic Rx (inhalers, theophylline/aminophylline, steroids); FEV1 < 75%; RA pO2 < 60; RA pCO2 > 50." Patients do NOT have COPD merely on the basis on a heavy smoking history or being labeled "COPD" in the chart *without other documentation*.
Congestive Heart Failure	At least three of the following: 1) presence of dyspnea; 2) rales thought to represent pulmonary congestion; 3) peripheral edema; 4) cardiomegaly on chest x-ray; 5) chest x-ray compatible with interstitial edema.	Note: as of 1/1/99, the STS proposes to change this definition to: "1. Within 2 weeks prior to procedure. Physician Dx of CHF is made. 2. Within 2 weeks prior to procedure, one or more are present: PND; dyspnea on exertion due to heart failure; pulmonary congestion on CXR. 3. Pedal edema or dyspnea alone are not diagnostic. 4. Pt should have received diuretics or digoxin." Note also that NYHA function class (below) refers only to the severity of the patient's heart failure *at the time of surgery*, and not to the severity of heart failure in the past.
Angina (yes/no)		Check this box if the patient has *ever* had angina.
Unstable Angina	Stable: Angina which is controlled by oral or transcutaneous medication. Unstable: The presence of on-going refractory ischemia that requires hospitalization in an intensive care unit and use of intravenous nitrate therapy for control.	The current STS definition of unstable angina requires hospitalization in an ICU and treatment with intravenous nitroglycerin. However, beginning 1/1/99, the STS proposes to replace this with Angina at rest (>20 min); or new onset (<2 months); or CCSC III angina; or recent acceleration in pattern and increase of one CCS class to CCS III; or variant angina; or non-Q MI; or post-infarction angina (>24 hrs); or "Clinical Classification" (IV nitrates (or equivalent), IV heparin (or equivalent), and telemetry monitoring). Patients with myocardial infarctions who present with angina should have their angina type and CCS class coded in addition to their myocardial infarction. Thus, a patient presenting with angina at rest who is subsequently diagnosed with a myocardial infarction would have angina=yes, type=unstable, CCS=class IV, MI=yes.

APPENDIX C: DEFINITIONS AND INSTRUCTIONS FOR CCMRP DATA SUBMISSIONS

Table C-1: Definitions and Instructions for CCMRP Data Submissions (cont.)

Data Elements	STS Definitions	CCMRP Comments, Modifications, and Examples
NYHA (New York Heart Association) Functional Class (for Congestive Heart Failure).	I= Patients with cardiac disease but without resulting limitation of physical activity. Ordinary physical activity does not cause undue fatigue, palpitation, dyspnea, or angina. II= Patients with cardiac disease resulting in slight limitation of physical activity. They are comfortable at rest. Ordinary physical activity results in fatigue, palpitations, dyspnea, or anginal pain. III= Patients with cardiac disease resulting in marked limitation of physical activity. They are comfortable at rest. Less than ordinary physical activity results in fatigue, palpitations, dyspnea, or anginal pain. IV= Patients with cardiac disease resulting in inability to carry on any physical activity without discomfort. Symptoms of cardiac insufficiency or of the anginal syndrome may be present even at rest. If any physical activity is undertaken, discomfort is increased. If this information is not defined in the patient's chart, the minimum data requirement is the notation of a NYHA status to be calculated by the data manager using the patient's recorded history and the detail definition of the three scales. Asymptomatic patient should be classified as a NYHA Class I. NYHA class should be utilized to determine functional class secondary to heart failure.	NYHA class refers to the severity of *recent* heart failure (within two weeks of surgery) and not to past episodes of CHF. If a patient has a history of heart failure but is well compensated with no or only minimal symptoms at the time of surgery, the patient is coded as NYHA=class I, CHF=yes.

APPENDIX C: DEFINITIONS AND INSTRUCTIONS FOR CCMRP DATA SUBMISSIONS

Table C-1: Definitions and Instructions for CCMRP Data Submissions (cont.)

Data Elements	STS Definitions	CCMRP Comments, Modifications, and Examples
CCS (Canadian Cardiovascular Society) angina class	I= Ordinary physical activity does not cause angina. Angina may occur with strenuous, rapid or prolonged exertion at work or recreation. II= There is slight limitation of ordinary activity. Angina may occur with walking or climbing stairs rapidly, walking uphill, walking or stair climbing after meals or in the cold, in the wind, or under emotional stress, or walking more than two blocks on the level, and climbing more than one flight of stairs at normal pace under normal conditions. III= There is marked limitation of ordinary physical activity. Angina may occur after walking one or two blocks on the level or climbing one flight of stairs under normal conditions at a normal pace. IV= There is inability to carry on any physical activity without discomfort; angina may be present at rest.	CCS angina class refers to the highest *recent* class (in the two weeks before surgery). Patients who have *never* had angina are coded as angina=no, CCS=class I. Class I also refers to patients who have had angina in the past but are now *asymptomatic* and to patients who have symptoms only with strenuous activity (both would be angina=yes, CCS=class I). Patients with angina at rest or with even minimal activity are class IV (this includes many patients with unstable angina). Classify angina when present even for patients with myocardial infarctions. Thus, code a patient presenting with chest pain at rest and a myocardial infarction as angina=yes, angina unstable=yes, CCS=class IV, MI=yes.

APPENDIX C: DEFINITIONS AND INSTRUCTIONS FOR CCMRP DATA SUBMISSIONS

Table C-1: Definitions and Instructions for CCMRP Data Submissions (cont.)

Data Elements	STS Definitions	CCMRP Comments, Modifications, and Examples
Acuity (elective, urgent, emergent, or salvage)	Refers to the severity of the patient's condition in the immediate pre-operative time period. An elective operation is one that is performed on a patient with cardiac function that has been stable in the days or weeks prior to operation. Elective cases are usually scheduled at least one day prior to the surgical procedure. An urgent operation is one which surgery is required within 24 hours in order to minimize the chance of further clinical deterioration. Typical patients include those with sudden, worsening chest pain and/or congestive heart failure, life-threatening coronary vascular anatomy, or those who are symptomatic at rest. Delay in operation in necessitated only by attempts to improve the patient's condition, availability of a spouse or parent for informed consent, availability of blood products, or the availability of results of essential laboratory procedures or tests. An urgent status is not merited by left main disease alone, use of heparin infusions, or purely administrative considerations. Patients requiring emergency operations will have ongoing, refractory, unrelenting cardiac compromise, with or without hemodynamic instability, and not responsive to any form of therapy except cardiac surgery. An emergency operation is one in which there should be no delay in providing operative intervention. Emergent/salvage: Patient undergoing CPR en route to the operating room or prior to induction of anesthesia.	Status refers to the patient's condition immediately *before surgery*; it should not reflect instability which occurs after the induction of anesthesia or the operative outcome. Status does not assess operative risk but rather how expediently surgery must be performed. Thus, some elective patients may be at higher risk than urgent patients; for example, an elderly patient with an ejection fraction of 20% and COPD operated on electively compared to a young patient with a normal ejection fraction who has ongoing unstable angina. Elective surgeries are performed on patients whose cardiac function has been stable. They are usually scheduled at least one day prior to surgery, and the clinical picture allows discharge from the hospital with readmission for surgery later. A surgery is elective even if the patient was operated on during a hospitalization for an acute coronary syndrome if they *could have been discharged* to have their surgery at a later date. Elective patients are at a low risk for morbidity or death outside of the hospital given good medical management and restricted activities. Urgent surgeries are performed on patients whose medical condition requires continuous hospitalization prior to CABG. The patients may be operated on in the next available surgical suite but would not necessarily take precedence over an elective case and, *clarifying the STS definition,* could wait more than 24 hours, possibly several days. A critical feature that distinguishes urgent from elective patients is that urgent patients *cannot be safely discharged* prior to their CABG, but they can safely await CABG in the hospital. An intra-aortic balloon pump or IV nitroglycerin may be part of treatment. Emergent surgeries are performed on patients whose condition dictates that the surgery be performed within several hours to prevent morbidity or death. These cases should take precedence over an elective case, cause a new operating room to be opened, or be done at night or on a weekend if necessary. A critical feature which distinguishes emergent from urgent patients is that emergent patients *cannot safely delay CABG even while they are in the hospital.* Salvage surgeries are performed on a patient undergoing CPR en route to operating room or in the operating room prior to induction of anesthesia.
Ejection Fraction (%)		Most recent prior to surgery

APPENDIX C: DEFINITIONS AND INSTRUCTIONS FOR CCMRP DATA SUBMISSIONS

Table C-1: Definitions and Instructions for CCMRP Data Submissions (cont.)

Data Elements	STS Definitions	CCMRP Comments, Modifications, and Examples
Method of Measuring Ejection Fraction (LV gram, radionuclide, or echocardiogram)		Ejection fraction is determined by one of the following methods (in order of preference): Left ventriculogram, radionuclide scan, or echocardiogram. Ejection fraction (EF) is an important predictor of risk. Make every effort to obtain it when available. Use the last determination of EF prior to surgery. When an official report gives both a calculated EF and an estimated EF, use the calculated value. The EF must be obtained from the official report of one of the above three studies; do not use an "estimate", which, in contrast to the STS system, will be considered the same as a missing value. If a range of EFs are given, enter the mean value (e.g. for "30 to 35%", enter "32" - the STS system has no space for 32.5). If the EF or "left ventricular function" is described qualitatively, enter as follows: normal = 65%, mildly reduced = 50%, moderately reduced = 35%, and severely reduced = 20%. Transesophageal echocardiograms (TEEs) done during surgery should not be used as a source for either mitral regurgitation or EF, unless it is the only available study, because operative conditions can artifactually alter both mitral regurgitation and ejection fraction.
Left Main Stenosis (%)	% value	
Coronary Disease - Number of Vessels	None, single, double, triple. The number of major (LAD system, Cx system, Right system) coronary vessels with > 50% narrowing in any angiographic view. Enter *none* if only left main disease.	The number of vessels refers to the number of major coronary arteries which are diseased. Consider a major coronary artery as diseased if it or one of its first order branches has a >50% stenosis. The three major coronary arteries and their first order branches are 1) the left anterior descending (LAD) with its branches the diagonals; 2) the circumflex (Cx) with its branches the obtuse marginals (OM's) or circumflex marginals; and 3) the right coronary artery (RCA) with its branch the posterior descending artery (PDA). Consider left main disease separately from the LAD and circumflex. Thus, code the "number of vessels" as "none" for a patient has stenosis of the left main but not the LAD, circumflex, or RCA. When the posterior descending artery (PDA) is supplied by the circumflex (i.e., when the circumflex instead of the right coronary artery is dominant), count the PDA (but NOT the non-dominant RCA) as a major vessel. Thus, a patient with stenoses of the LAD, an obtuse marginal branch off of the circumflex, and the PDA off of the circumflex would be coded as having triple vessel disease (even if the non-dominant right coronary is normal). When a large ramus medianus branch supplies part of the LAD or circumflex distribution, count the ramus as a first order branch of one of those vessels. Thus, a patient with stenoses of the ramus, circumflex, and RCA may be counted as 3 vessel disease (however, do NOT count 3 vessel disease if disease involves the LAD, circumflex, and ramus but not a dominant RCA). NOTE: the number of major arteries which are counted as diseased may differ from the number of bypass grafts placed (e.g., a graft may be placed to a vessel with < 50% stenoses or two grafts to the LAD and diagonal even though both are part of a single major vessel).
Mitral Insufficiency	Is there evidence of regurgitation: 0 = none, 1 = trivial, 2 = mild, 3 = moderate, 4 = severe	Mitral insufficiency (or regurgitation) should be determined by (in order of preference) either the echocardiogram or the left ventriculogram. The preferred order for MR favors echocardiogram over left ventriculogram; this is the opposite of the preferred order for ejection fraction. However, either method is adequate and it is not necessary to obtain an echocardiogram in patients already having ventriculograms. If a range of MR is given, enter the higher value (e.g. for "2 to 3" enter "3"). Transesophageal echocardiograms (TEE's) done during surgery should not be used as a source for either MR or EF, because operative hemodynamic conditions can artifactually alter both.
Cross Clamp Time	Minutes	
Perfusion Time	Minutes	

APPENDIX C: DEFINITIONS AND INSTRUCTIONS FOR CCMRP DATA SUBMISSIONS

Table C-1: Definitions and Instructions for CCMRP Data Submissions (cont.)

Data Elements	STS Definitions	CCMRP Comments, Modifications, and Examples
Internal Mammary Artery (IMA) used	yes/no	
Cardioplegia	yes/no	
Date of Discharge		
Patient Status at Discharge		Note for STS users: CCMRP will collect the data element “Mortality (yes/no)”
Date of Death	mm-dd-yy	If known